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THE ACTINIAN FAUNA OF THE GULF OF CALIFORNIA

By Oskar Carlgren

Our knowledge of the actinian fauna of Baja California and the west coast of Mexico is very incomplete. Verrill (1869) mentioned with some doubt the occurrence of *Epizoanthus elongatus;* in 1893 McMurrich described *Anemonia ? inequalis* (probably a *Gyrostoma* McMurrich, 1904), *Oulactis california,* and *Cerianthus vas;* in 1902 Gravier described a pelagic cerianthid, *Dactylactis benedeni;* in 1940 I proposed three species, *Alicia beebei, Nemanthus californicus,* and *Actinothoë californica.* Thus, up to this time only eight species of actinians were known from these districts.

The present paper is the result of an examination of a collection made by E. F. Ricketts during a cruise in the Gulf of California in 1940. The collection is rather large, containing, according to my opinion, 28 species, 16 of which are Actiniaria (including 3 new genera and 8 new species), 2 are Ceriantharia (one a new species), and 10 are Zoantharia (of which 9 are new species). Some species seem to be identical with those described by Verrill in 1869 from the coast of Panama. Unfortunately, Verrill's descriptions of his species are very incomplete, inasmuch as he usually described only the exterior and the color. I think, however, that my identifications of his species of Actiniaria are correct as a whole, but I am not certain of the Zoantharia. Identification of Verrill's species of this group is very difficult.

All the types and most of the specimens mentioned under collecting records are in the United States National Museum.

Order ACTINIARIA

Family HALCAMPOIDIDAE

CALAMACTIS, new genus

Elongate Halcampoididae with well-developed physa. Column smooth, not divided into regions. No sphincter. Tentacles few, rather short. A single siphonoglyph fairly well developed. All 12 pairs of mesenteries perfect and filamentous, the first cycle of mesenteries fertile, the second sterile. Retractors very strong, reniform. The same number of mesenteries proximally and distally. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophors.

CALAMACTIS PRAELONGUS, new species

FIGURE 78, *a*, *b*

Tentacles 24. Retractors of the mesenteries of the second cycle weaker than those of the first but of same appearance. Basitrichs of the column 14–17 by 2.8–3 μ; those of the tentacles 18.3–21 by 3–3.5 μ; those of the actinopharynx 19–26.2 by 2.8–4 μ; those of the filaments partly 10.6–12 by about 2.2 μ, partly 24–31 by 5–5.6 μ, the latter broad in their basal end. Microbasic *p*-mastigophors of the actinopharynx 17–24 by 4.2–5 μ; those of the filaments 18.3–25 by 4.2–5 μ.

Measurements.—Length 7 cm. in contracted and very deformed condition.

Holotype.—U.S.N.M. No. 49453, Estero de la Luna, Sonora, Mexico, April 10, 1940.

Remarks.—The single specimen is strongly contracted, deformed, and turned inside out. Figure 78, *a*, shows the appearance of a retractor; 78, *b*, of a parietal muscle of the first cycle.

Family ANDVAKIIDAE

ANDVAKIA INSIGNIS, new species

FIGURE 78, *c*, *d*

Column divisible into physa, scapus, and scapulus. Scapus with tenaculi incrusted with grains of lime-sand and foraminifers. The sphincter is mesogloeal, very long but weak, stronger in its uppermost and lowermost parts, between which consisting of a single row of meshes, wholly separated from the endodermal muscles of the column and situated either in the middle of the column or nearer the ectoderm. Tentacles about 24, short, their longitudinal muscles ectodermal. Siphonoglyphs indistinct. Six perfect and fertile pairs of mesenteries and five pairs of imperfect ones; on the one side of a directive mesentery a pair of the second cycle is

lacking. The mesenteries of the second cycle may have filaments. Retractors of the perfect mesenteries very strong, reniform to circumscribed, with high, branched folds (fig. 78, *c*). The parietal muscles (fig. 78, *d*) are well developed but are not distributed on the column. The mesenteries of the second cycle resemble the parietal muscles of the primary mesenteries. Nematocysts of the tentacles partly 10–15.5 by 1.5–2 μ, partly 19–26.8 by 2.2–2.5 μ (both basitrichs), those of the actinopharynx partly 24–26.8 by 2.8–3 μ (basitrichs), partly 24–28 by 5–7 μ (microbasic *p*-mastigophors), partly 31–39.5 by 5.6–7 μ (probably microbasic amastigophors); those of the filaments 15.5–18.3 by 2.8–4 μ (microbasic *p*-mastigophors); those of the acontia partly 15.5–18.3 by 1.5 μ (basitrichs), partly 42.3–49.3 by 5.6–7 μ (microbasic amastigophors).

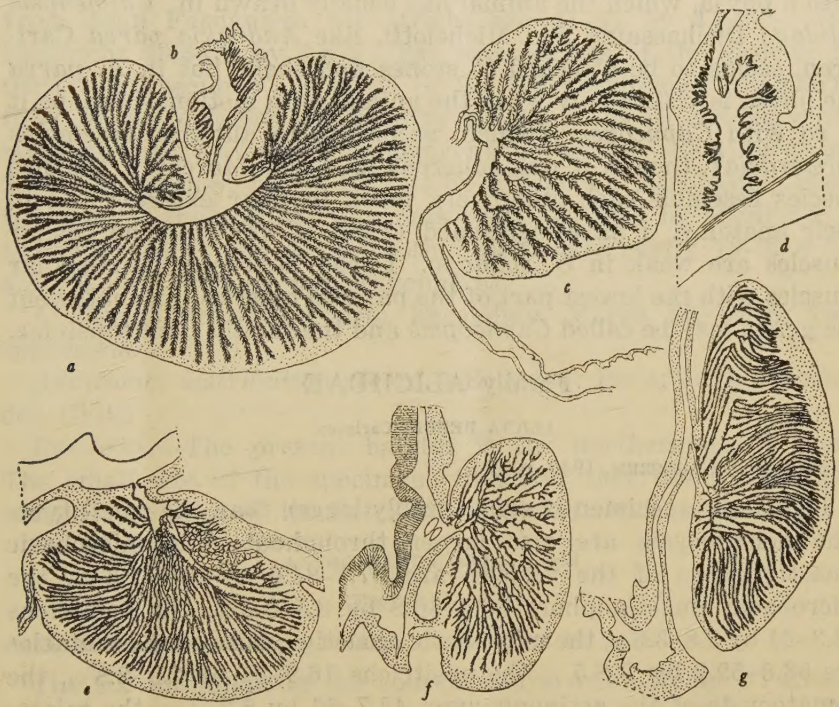

FIGURE 78.—*a, b, Calamactis praelongus,* new species: *a,* Retractor; *b,* parietal muscle of first cycle. *c, d, Andvakia insignis,* new species: *c,* Retractor of perfect mesentery; *d,* parietal muscles. *e, f, Anthopleura dowii* Verrill, sphincter of two specimens. *g, Bunodosoma californica,* new species, sphincter.

Measurements.—Length about 1.2 cm., breadth 0.4 cm.

Cotypes.—Two specimens, U.S.N.M. No. 49442, Gabriel Bay, Espíritu Santo Island, April 12, 1940.

Remarks.—The proximal end of one specimen is invaginated, that of the other is visible. I have sectioned the most proximal

part of the body in order to find out if there is a physa or a pedal disc proper. If the former is present, the species is an *Andvakia;* if the latter, it may be referred to the family Isophelliidae. Although it is very difficult to determine whether basilar muscles are present in specimens having a small proximal end, and a mistake could easily be made, I think the basal end is a physa. I do find muscles resembling basilar muscles, but they seem to run together with the parietal muscles, of which they may be the most proximal part. Likewise, the families Andvakiidae and Isophelliidae are closely related to each other. The species of the latter family have very likely originated in forms having a physa, as do the andvakiids. It is possible that the genus *Capneopsis* Duchassaing and Michelotti is identical with *Andvakia* and that it is provided with a physa, which the animal has usually drawn in. *Capneopsis solidago* Duchassaing and Michelotti, like *Andvakia parva* Carlgren, seems to be attached to stones and shells but in *A. parva* the physa is visible only when the animal is in motion. Perhaps it is so with *Capneopsis* (which, according to authors, resembles *Edwardsia*), though it was adherent to rocks. Moreover, the two species resemble each other very much in their exterior and in their anatomy. I have mentioned (1934, p. 32) that the basilar muscles are weak in *C. solidago*. I may have confused basilar muscles with the lowest part of the parietal muscles. In that event the genus may be called *Capneopsis* and the family Capneopsiidae.

Family ALICIIDAE

ALICIA BEEBEI Carlgren

Alicia beebei CARLGREN, 1940, p. 211.

The single specimen is considerably larger than the small type. The nematocysts are also larger throughout. The microbasic amastigophors of the vesicles are 67.7–84.6 by 10–11.3 μ, the microbasic amastigophors 80.4–86.8 by 8.5–9.2 μ, the basitrichs 18.3–21 by 2.8–3.5 μ, the microbasic amastigophors of the tentacles are 53.6–59.2 by 7–8.5 μ, the basitrichs 16.9–21 by 2.5–2.8 μ, the nematocysts of the actinopharynx 43.7–66 by 6.3–7 μ, the microbasic amastigophors of the filaments are 35.2–45 by about 7 μ, the microbasic *p*-mastigophors 7–12.7 by 3.5–4 μ. In my paper of 1940, p. 212 line 4, "mesenteries 96" should be followed by "; 6."

Measurements.—Length of the column 8.5 cm., breadth of pedal disc 6–7 cm., length of tentacles up to 12 cm., breadth up to 0.2 cm.

Collecting record.—Puerto Escondido, found pelagic in tide pool, March 26, 1940, 1 specimen.

Additional distribution record.—Arena Bank, Baja California.

Family ACTINIIDAE

PHYMACTIS CLEMATIS (Drayton)

Actinia clematis DRAYTON, *in* Dana, 1846, p. 130, pl. 1, figs. 4, 5.
Phymactis clematis MILNE-EDWARDS, 1857, p. 275.—VERRILL, 1869, p. 476.—CARLGREN, 1898, p. 17; 1922, p. 145.—MCMURRICH, 1904, p. 259.
Actinia florida DRAYTON, *in* Dana, 1846, p. 131, pl. 2, figs. 6–8.
Phymactis florida MILNE-EDWARDS, 1857, p. 274.—VERRILL, 1869, p. 476.

The nematocysts of the two small specimens agree fairly well with those of the individuals from Juan Fernández (Carlgren, 1922, p. 146), but those of the marginal spherules are shorter in the latter. The atrichs of the marginal spherules are 48–77.6 by 4.2–5.6 μ and 36.7–70.5 by 4.2–5.6 μ respectively in the two specimens and the very common basitrichs 53.6–87.4 by 2.8 μ and 51–86 by 2.8 μ respectively. In a specimen of about the same size from Juan Fernández, the atrichs are 41–67 by 4.2–6 μ, the basitrichs 49.3–76 by 2.8 μ. The nematocysts of the vesicles in the larger specimen are 17–21 by 2.5–3 μ (basitrichs, common); those of the tentacles 18.3–26.8 by 2.5–2.8 μ (basitrichs, very numerous); those of the actinopharynx partly 18.3–33.8 by about 2.8 μ (basitrichs), partly 19.7–24 by 4.2–5.6 μ (microbasic *p*-mastigophors); those of the filaments partly 10–12.7 by about 2.2 μ, partly 21–36 by 3.5–4.2 μ (both basitrichs), partly 19–23.3 by 4.2–5.6 μ (microbasic *p*-mastigophors).

Collecting record.—Puerto Escondido, March 26, 1940, two specimens.

Additional distribution record.—Ecuador; Peru; Juan Fernández, Chile.

Remarks.—The present habitat is the northernmost known. The small size of the specimens indicates that the species has reached the limit of its distribution toward the north.

ANTHOPLEURA DOWII Verrill

FIGURE 78, *e, f*

Anthopleura dowii VERRILL, 1869, p. 474; 1899, p. 44, fig. 8.

The six specimens in the collection are undoubtedly *A. dowii.* The color of the tentacles is greenish with light spots in the largest specimen. The exterior is well described by Verrill: "The pores through which water may be ejected" are certainly those of the marginal spherules. The sphincter is almost palmate in the two specimens examined (fig. 78, *e, f*). In the largest specimen there are 2 broad siphonoglyphs symmetrically set and strongly prolonged aborally, 24 pairs of perfect and fertile mesenteries including the directives and 24 pairs of imperfect, sterile, and filamentous

mesenteries. At the base 96 mesenteries and about the same number of tentacles are present. The retractors of the perfect mesenteries are bandlike; the parietobasilar muscles strong, forming a distinct shelf; the basilar muscles well developed. I have examined the nematocysts of the tentacles and marginal spherules in three specimens, the nematocysts of the other parts of the body in two. The nematocysts of the marginal spherules are partly 41–60 by 5.6–7 μ (atrichs), partly 41–56 by 2.8–3.5 μ (basitrichs); those of the column 10–22.6 by 1.52–2.8μ (basitrichs, probably two kinds); those of the tentacles 19.7–26.8 by 2.5–3 μ (basitrichs); those of the actinopharynx partly 21.8–31 by 3–3.5 μ (basitrichs), partly 19.7–22.6 by 4.2–5.6 μ (microbasic *p*-mastigophors); those of the filaments partly 32.4–42.3 by 5–5.6 μ, partly 11.3–17 by 1.5–2.5 μ (both basitrichs), partly 19.7–25.4 by 4.2–5.6 μ (microbasic *p*-mastigophors).

Measurements.—The largest specimen, pedal disc 4 by 2 cm., height of column about 5 cm.

Collecting records.—Puerto Escondido, March 26, 1940, one specimen, the largest; Angeles Bay, April 1, 1940, two specimens; San Carlos Bay, Sonora, Mexico, April 4, 1940, three specimens.

Additional distribution records.—Panama; Rialejo; Pearl Islands; El Salvador.

BUNODOSOMA CALIFORNICA, new species

FIGURE 78, *g*

The pedal disc is well developed but narrower than the oral disc. The whole column is provided with closely set vesicles, as in other species of the genus. The fosse is shallow, the sphincter well developed and circumscribed, of almost palmate type, or with a short, thin main lamella. In figure 78, *g*, I have illustrated the sphincter of a specimen from Angeles Bay; sections of specimens from Point Lobos and Tiburón Island indicate similar sphincters. The three specimens from Puerto Escondido and the one from Tiburón Island have marginal spherules in the fosse; the other specimens apparently do not, but if they are present they must be very rare.

The number of tentacles ranges between 120 and 146 in the four larger specimens. The oral disc is wider than the pedal disc and in the very contracted specimen from Point Lobos it is folded, mainly because of the strong contraction of the body. The longitudinal muscles of the tentacles are well developed and ectodermal. The number of siphonoglyphs varies: the specimen from Tiburón Island has three; two individuals from Angeles Bay and the specimen from Port Lobos two, symmetrically set (those from

the latter not examined in regard to directives) ; two individuals from Puerto Escondido are provided with three and six siphonoglyphs, only one joined with directives. There are numerous perfect mesenteries; I counted 46 pairs in one specimen. There are more mesenteries at the base than at the margin. The retractors of the mesenteries are diffuse and not strong, the parietobasilar muscles distinct. The nematocysts of the marginal spherules are partly 32.4–48.6 by 4.2–5.5 μ (32.4–42.3 by 4.2–5 μ, 38–47.9 by 5.5 μ, 39.5–47.5 by 5–5.5 μ, 39.5–48.6 μ) (atrichs), partly 24–25.4 by 2.8 μ (few basitrichs in the one individual examined) ; those of the vesicles 16.9–31 by 2.5–4.2 μ (basitrichs, probably two kinds) ; those of the tentacles 24–29.6 by 2.8–3 μ (basitrichs) ; those of the actinopharynx partly 23.3–33.8 by 3–3.5 μ, partly 12.7–16 by 2.2–2.8 μ (both basitrichs) ; those of the filaments partly 11.3–17.6 by 1.5–2.2 μ, partly 32.4–38.8 by 5–7 μ (both basitrichs), and partly 19.7–26 by 4.2–5.6 μ (microbasic *p*-mastigophors in 12 specimens from Tiburón Island and Point Lobos examined).

Measurements.—The very contracted specimen from Point Lobos, oral disc 4 cm., height 1.7 cm.; an individual from Angeles Bay, breadth 4 by 2.5 cm., height 1.3 cm.

Cotypes.—Three specimens, U.S.N.M. No. 49447, Puerto Escondido, March 26, 1940.

Collecting records.—Point Lobos, Espíritu Santo Island, March 20, 1940, 1 specimen; Angeles Bay, rocky coast, April 1, 1940, 3 specimens; south of Tiburón Island, April 3, 1940, 1 specimen.

Remarks.—The species is undoubtedly nearly related to *Bunodosoma* (*Eucladactis*) *grandis* (Verrill), to which I was at first inclined to refer the present specimens, but as *grandis* has smaller, very closely set, and more compound vesicles and very numerous tentacles (according to Verrill more than 500 in a large specimen) I think it is best to propose a new species for our specimens.

BUNODACTIS MEXICANA, new species

FIGURE 79, *a*

Pedal disc wide. Column, except for a short part of the limbus, provided with longitudinal rows of verrucae, which are more or less compound at the shallow fosse. Sphincter endodermal, pinnate-circumscribed. Tentacles up to more than 100, short, conical, hexamerously or irregularly arranged. Two distinct but not broad siphonoglyphs, symmetrically set or not, slightly prolonged aborally or not. Mesenteries regularly or irregularly arranged. Most of mesenteries perfect and apart from the directives fertile. Sterile mesenteries seemingly at the base. Retractors bandlike but

weak. Nematocysts of the columns 14–18.3 by 2.5–2.8 μ (basitrichs); those of the tentacles 15.5–22.6 by 2.2–2.5 μ (basitrichs); those of the actinopharynx partly 21–28 by about 3 μ (basitrichs), partly 19–22.6 by 4.5–5 μ (microbasic *p*-mastigophors); those of the filaments partly 19–33.8 by 5.6–6.3 μ, partly 11.3–16.2 by 2.8 (few, both basitrichs), partly 21–24 by 4.2–5 μ (microbasic *p*-mastigophors).

Measurements.—The largest specimen, height 1 cm., breadth 1.8 cm.

Cotypes.—Two specimens, U.S.N.M. No. 49451, San Carlos Bay, Sonora, Mexico, March 30, 1940.

Remarks.—The larger, fertile specimen provided with two siphonoglyphs, not symmetrically set, has 118 tentacles; the smaller, sterile specimen, about 96. I have drawn the sphincter of the sterile individual (fig. 79, *a*.).

EPIACTIS IRREGULARIS, new species

FIGURE 79, *b*, *c*

Tentacles about 70. Sphincter restricted (diffuse circumscribed). Pairs of mesenteries 6 + 6 + 12 + 12, the mesenteries of the last cycle absent in the exocoels next to the mesenteries of the first cycle. Same number of mesenteries proximally and distally. Nematocysts of the columns partly 8.5–11 by 2.2 μ, common, partly 15.5–18.3 by 2.5 μ, common, a few 21–25 by 2.8 μ (all basitrichs); those of the tentacles partly 8.5–11.3 by about 2.2 μ, partly 18.2–26.8 by 2.8 μ (all basitrichs); those of the actinopharynx partly 21–26.8 by 3 μ (basitrichs), partly 19.7–21.8 by 4.2–5.5 μ (microbasic *p*-mastigophors); those of the filaments partly 11.3–18.3 by 2.2–2.8 μ, partly 38–43.7 by 3.5–4.2 μ (both basitrichs), partly 18.3–22.6 by 4.2–5.5 μ (microbasic *p*-mastigophors).

Measurements.—Length and breadth about 1.1 cm.

Holotype.—U.S.N.M. No. 49446, east of La Paz, March 21, 1940.

Remarks.—The sphincter (fig. 79, *b*) is almost restricted with the strongest folds distally. It has quite a different appearance from that of *Epiactis prolifera*, the sphincter of which seems to be fairly constant. I have examined the sphincter of two specimens of the latter species, one from Santa Cruz, provided with embryos on the column, and another from Puget Sound, and both agree in the main with that figured by Torrey (1902). The tentacles are of normal size and between 70 and 80 in number. The arrangement of the mesenteries in half of a specimen is 1 (directive), 3, 4, 2, 4, 3, 1, 3, 4, 2, 4, 3, 1, 3, 4, 2, 4, 3, 1 (directive). Twelve pairs of mesenteries are perfect. There are the same number of mesenteries proximally and distally. The retractors are restricted,

forming branched folds, which are stronger on the directives (fig. 79, *c*) than on the other mesenteries. The single specimen is sterile.

PHIALOBA, new genus

Pedal disc well developed. Column smooth, with very numerous basitrichs. Margin tentaculate. No sphincter. Tentacles conical, short, up to more than 400, most of them on the border of the lobed oral disc, their longitudinal muscles ectodermal. Two not deep siphonoglyphs, two pairs of directives. Numerous pairs of perfect fertile mesenteries, including the directives. Considerably more mesenteries at the margin than at the limbus. Retractors bandlike, diffuse. Cnidom: spirocysts, basitrichs, and microbasic *p*-mastigophors.

FIGURE 79.—*a, Bunodactis mexicana,* new species, sphincter. *b, c, Epiactis irregularis,* new species: *b,* Sphincter; *c,* retractor of directive. *d, Phialoba steinbecki,* new species, retractor of directive. *e-g, Phyllactis concinnata* (Drayton): *e,* Sphincter of specimen from Puerto Refugio; *f,* sphincter of specimen from Point Lobos; *g,* elongate sphincter. *h, Phyllactis bradleyi* (Verrill), sphincter.

PHIALOBA STEINBECKI, new species

FIGURE 79, *d;* PLATE 14, FIGURE 5

Column with extraordinarily numerous, closely set basitrichs. No sphincter. Tentacles hexamerously arranged, probably not retractile, or imperfectly so, most of them situated close to the margin. About 48 pairs of perfect and fertile mesenteries. Retractors of the perfect mesenteries rather bandlike with high, close,

somewhat branched folds. Parietobasilar muscles weak. Nematocysts of the column 11.3–39.5 by 2.2–3.5 μ (basitrichs, probably two kinds, the larger over 24 μ usually rare; in a specimen from Coronado Islands numerous); those of the tentacles 15.5–22.6 by 2.5–3 μ (basitrichs, common); those of the actinopharynx partly 12.7–26.8 by 2.2–3 μ (basitrichs, probably two kinds), partly 22.6–28 by 4.2–5.6 μ (microbasic *p*-mastigophors); those of the filaments partly 10–28.2 by 1.5–3.5 (basitrichs, probably two kinds), partly 19.7–26.8 by 4.2–5 μ (microbasic *p*-mastigophors).

Color in alcohol: The tentacles and oral disc of a specimen from Coronado Islands are green, two specimens from La Paz are brown, a fourth almost uncolored.

Cotypes.—Two specimens, U.S.N.M. No. 49459, east of La Paz, March 21–22, 1940.

Additional distribution records.—Coronado Islands, March 27, 1940, two specimens; Puerto Escondido, March 26, 1940, two specimens.

Remarks.—The pedal disc is well developed, but its diameter is considerably shorter than that of the oral disc. The basitrichs of the column are as closely set as the atrichs in the marginal spherules. Possibly they are arranged in groups. Most of the tentacles are so closely set at the margin that one could believe they are arranged as those of the so-called stichodactyline species. However, this is not the case. Plate 14, figure 5, shows the exterior of a specimen; figure 79, *d*, the retractor of a directive mesentery. The nematocysts have been examined in all specimens, and they agree. In a specimen with more than 400 tentacles there are 192 mesenteries at the base.

PHYLLACTIS CONCINNATA (Drayton)

FIGURE 79, *e-g;* PLATE 14, FIGURE 1

Metridium concinnatum DRAYTON, *in* Dana, 1846, p. 152, pl. 5, figs. 40, 41.
Oulactis concinnata MILNE-EDWARDS, 1857, p. 292.—VERRILL, 1869, p. 463.—ANDRES, 1883, p. 505.—VERRILL, 1907, p. 268 (footnote).
Oulactis californica MCMURRICH, 1893, p. 196.
Asteractis concinnata PAX, 1912, p. 12.

The pedal disc is well developed, the body usually strongly contracted and then low (pl. 14, fig. 1). The upper part of the column below the fronds is provided with 40 to 48 longitudinal rows of verrucae to which sand may adhere. The fronds form a ruff, each one bearing a variable number of papillae. The uppermost fronds issuing from the first 12 endocoels project distally over the others. The sphincter varies considerably. It is diffuse, sometimes elongate, sometimes restricted; rarely it shows a tendency to be unilaterally circumscribed. In figure 79, *e*, I have drawn

the sphincter of a specimen from Puerto Refugio. It recalls the sphincter of *Anthostella* (*Phyllactis*) *conchilega* figured by McMurrich (1905) but on other slides not far from that figure the middle part, up to about a third of the sphincter, is attached to the column. The sphincter of the specimen from Point Lobos is more restricted (fig. 79, *f*); two others from Puerto Escondido and La Paz are more elongate (fig. 79, *g*). The tentacles number 40 or 48, conical, rather short, sometimes longitudinally sulcated in contracted state, their longitudinal muscles ectodermal, forming high folds that are closely set and sometimes a little branched. There usually are two rather broad siphonoglyphs that are symmetrically set and aborally more or less prolonged. The specimen from Puerto Refugio has, however, a single siphonoglyph. The pairs of mesenteries are 20 or 24, all perfect and fertile, including the directives; the specimen provided with a single siphonoglyph has 20 pairs. There are the same number of mesenteries proximally and distally. The retractors are diffuse, strong, especially below the actinopharynx. The parietobasilar muscles are well developed, forming a distinct shelf on the mesenteries. There are numerous zooxanthellae in the endoderm. The nematocysts of the column are 12.7–18.3 by 2.2–2.5 μ (basitrichs); those of the fronds 10–14 by 2.2–2.5 μ (basitrichs); those of the tentacles 21–33.8 by 2.5–2.8 μ (basitrichs, numerous); those of the actinopharynx partly 19.7–32.4 by 2.8–3 (3.5) μ (basitrichs), partly 21–31.8 by 4–6.3 μ (microbasic *p*-mastigophors); those of the filaments partly 31–49.3 by 3–4.2 μ, partly about 10 by 2.5 μ (few, both basitrichs), partly 21–31.8 by 4.2–5.6 μ (microbasic *p*-mastigophors). Three specimens were examined, all agreeing in the size of the nematocysts.

Color in alcohol.—One specimen brown; another almost uncolored or pale brown.

Measurements.—The largest specimen, length of the column about 2.5 cm., breadth of the body up to 3.6 cm.

Collecting records.—Espíritu Santo Island, Point Lobos, March 20, 1940, 1 specimen; east of La Paz, March 21–22, 1940, 1 specimen; Puerto Escondido, March 26, 1940, 4 specimens; Puerto Refugio, Angel de la Guarda Island, April 2, 1940, 1 specimen.

PHYLLACTIS BRADLEYI (Verrill)

FIGURE 79, *h*; PLATE 14, FIGURE 2

Asteractis bradleyi VERRILL, 1869, p. 463; 1899a, p. 46, figs. 10-12.—ANDRES, 1883, p. 506.

The body of the larger specimen is very elongate (pl. 14, fig. 2); the smaller specimen is also longer than broad. The verrucae occupy only a small space below the ruff. In the large specimen

the papillae of the slightly developed fronds are scarce in some places, more numerous in others; in the smaller specimens they run out from more distinct fronds, which project as a fringe at the outer rim of the ruff (visible on the larger specimen, too). The 12 rows of fronds corresponding to the 12 primary tentacles are broader than the others and extended farther toward the tentacles than the other rows. The 24 narrow rows are the shortest. The sphincter is rather curious: in the part where the papillae of the fronds are scarce (see above) there is only a diffuse sphincter; in the part where they are numerous a unilateral, circumscribed, very fine and branched sphincter is present outside the diffuse sphincter (fig. 79, *h*). There are about 48 tentacles. They are conical and short, and their ectodermal, longitudinal muscles are not strong. There are two broad siphonoglyphs symmetrically set, and 24 pairs of mesenteries, 2 of which are directives. The retractors of the mesenteries are strong, bandlike, those of the directives more restricted. The parietobasilar muscles are strong, forming a distinct, thick shelf on the mesenteries. The nematocysts of the column are 15.5–19.7 by 2.5 μ (basitrichs); those of the fronds 11.3–14 by 2–2.5 μ (basitrichs); those of the tentacles 14–26.8 by about 2–2.5 μ (in the larger specimen 14–19 μ) (basitrichs); those of the actinopharynx partly 21–31 by 2.8–3.5 μ (basitrichs), partly 22.6–27.5 by 4.5–6.3 μ (microbasic *p*-mastigophors); those of the filaments partly 25.4–46.5 by 2.8–3.5 μ (basitrichs), partly 21–28 by 5–5.6 μ (microbasic *p*-mastigophors).

Color in alcohol.—Pure white.

Measurements.—The larger specimen (pl. 14, fig. 2), length 5 cm., breadth 2.6 cm.

Collecting records.—El Mogote, sand flats, March 22, 1940, 2 specimens.

Additional distribution record.—Panama.

Remarks.—I have identified the specimens as *bradleyi*. A reexamination of *concinnata* as well as of *bradleyi* is necessary, however, in order to confirm my identification of the species described here.

Family AIPTASIOMORPHIDAE

AIPTASIOMORPHA ELONGATA, new species

FIGURE 80, *a*; PLATE 14, FIGURE 8

Pedal disc ordinarily developed. Column smooth, thin, with visible insertions of the mesenteries (pl. 14, fig. 8). Cinclides, if present, not set on elevations. In contraction of the animal uppermost part of column drawn into the lower and forming a para-

pet. No distinct sphincter. Tentacles smooth, ordinarily long, numerous, up to about 192, hexamerously arranged. Two narrow siphonoglyphs. Six pairs of perfect mesenteries, two pairs of directives. Considerably more mesenteries at the margin than at the

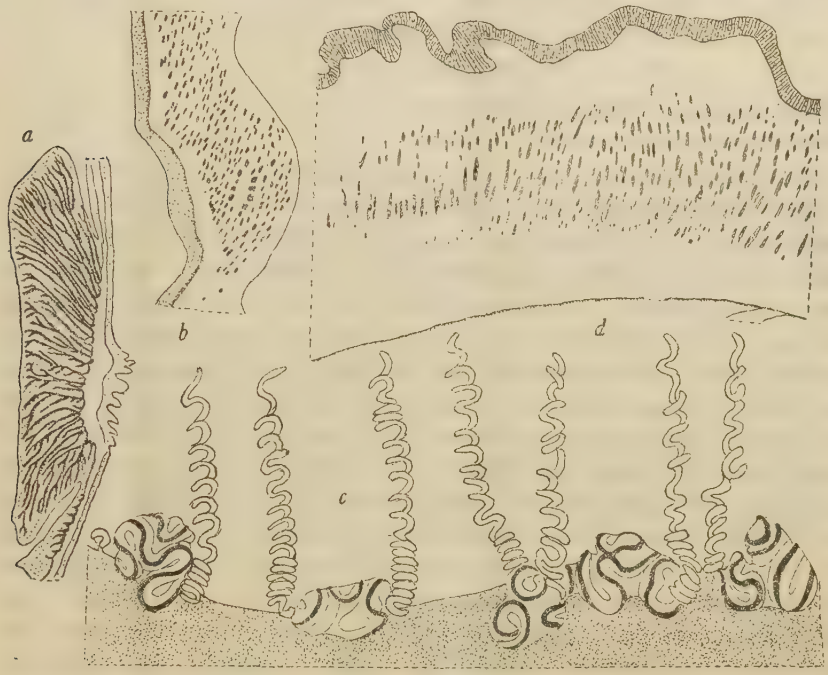

FIGURE 80.—*a, Aiptasiomorpha elongata,* new species, retractor. *b, c, Telmatactis panamensis* (Verrill): *b,* Upper part of sphincter; *c,* part of mesentery with pieces of discontinuous filament (black) and acontia. *d, Calliactis variegata* Verrill, lower part of sphincter.

limbus. Distribution of gonads unknown. Retractors bandlike (fig. 80, *a*). Perietobasilar muscles weak. Nematocysts of the column 13–17.6 by 4.2 (4.5) μ (microbasic *p*-mastigophors); those of the tentacles partly 15.5–21 by 2.8–3 μ (basitrichs, few), partly 19.7–24 by 3.5–4.5 μ (microbasic *p*-mastigophors or amastigophors); those of the actinopharynx partly 21–26 by 2.8 μ (basitrichs), partly 24–29.6 by about 4.2 μ (probably microbasic *p*-mastigophors); those of the filaments partly 27.5–32.4 by 4.2–4.5 μ (probably microbasic *p*-mastigophors), partly 11.3–14 by 4.2–4.5 μ (microbasic *p*-mastigophors); those of the acontia partly 39.5–53.6 by 6.3–9.5 μ (probably microbasic *p*-mastigophors), partly 14–18.3 by 2.2–2.5 μ (basitrichs).

Measurements.—The largest specimen, length 3 cm., greatest breadth 1.8 cm.

Holotype.—San Carlos Bay, Sonora, Mexico, March 30, 1940.

Collecting records.—Point Lobos, Espíritu Santo Island, March 20, 1940, one specimen; Puerto Escondido, March 26, 1940, four specimens.

Family ISOPHELLIIDAE

TELMATACTIS PANAMENSIS (Verrill)

FIGURE 80, *b*, *c*

Phellia panamensis VERRILL, 1869, p. 440.
Phelliopsis panamensis VERRILL, 1899c, p. 214.

Sphincter alveolar, very elongate, wholly separated from the endodermal muscles of the column (fig. 80, *b*). Tentacles up to 96 in number; in contraction usually longitudinally furrowed; in older specimens often somewhat knobbed, their longitudinal muscles ectodermal. Two siphonoglyphs. Up to 48 pairs of mesenteries, 2 pairs of directives, 6 pairs perfect with filaments and acontia and strongly restricted to almost circumscribed, often reniform, strong retractors. Other mesenteries without filaments, but the mesenteries of the second cycle, and sometimes those of the third, have filaments and acontia. Filaments of these mesenteries discontinuous with acontia, usually two, one on the upper side and one on the lower of each piece of the filaments (fig. 80, *c*). Number of mesenteries somewhat more numerous than the tentacles. Nematocysts of the tentacles (33.8) 39.5–42.3 by 2.5–2.8 μ, in the largest specimen 50.8–70.5 by 2.8 μ (basitrichs); those of the actinopharynx partly 22.6–31 by 2.8–3 μ, partly 12.7–18.3 by 1.5–2 μ (both basitrichs), partly (in the largest specimen) 25.4–32 by 4.2–5.5 μ (microbasic *p*-mastigophors ?); those of the filaments partly 12.7–22 by 1.5–2 μ (basitrichs), partly 11.3–19.7 by 3.5–4.2 μ (microbasic *p*-mastigophors) partly 38–60.6 by 8.5–11.3 (microbasic amastigophors); those of the acontia partly (42.3) 52.2–66.3 (in the largest specimen 62–73.3 μ) by 8.5–12.7 μ (microbasic amastigophors), partly 21–25.4 by 2–2.5 μ (basitrichs). (The nematocysts of the largest specimens are usually longer than the smallest; the acontia have been examined in five specimens, the tentacles in three, the actinopharynx in two, and the filaments in four specimens.)

Measurements.—Of the largest specimen from Point Lobos, length 5.5 cm., greatest breadth 2 cm.; of the smallest specimen from Point Lobos, length 1.1 cm., breadth 0.5 cm.; of the largest specimen from Puerto Escondido, length 5 cm., breadth 2 cm.

Collecting records.—Point Lobos, Espíritu Santo Island, March 20, 1940, four specimens; Puerto Escondido, March 26, 1940, eight specimens; Coronado Island, two specimens; Puerto Refugio, April 2, 1940, one specimen.

Additional distribution record.—Panama.

Remarks.—The exterior is well described by Verrill. The arrangement of acontia in the mesenteries of the second (and third) order is apparently characteristic of the species. Figure 80, *c*, shows part of the mesentery with pieces of the discontinuous filament (black on the figure) and acontia. A very similar arrangement of the acontia is described by Panikkar (1936) in *Phytocoetopsis ramunni* Panikkar. It is possible, however, that a similar distribution of the acontia occurs also in other species of *Telmatactis* but has been overlooked. In figure 80, *b*, I have illustrated the upper part of a sphincter of a medium-sized specimen. The sphincter shows a tendency to stratification and recalls the sphincter of a *Telmatactis* from the Great Barrier Reef. The youngest mesenteries seem to appear somewhat earlier than the corresponding tentacles. The largest specimen has only 78 tentacles, but 92 mesenteries; the mesenteries of the fourth cycle are absent on one side of a directive.

Verrill (1899c, p. 214) proposed a new genus, *Phelliopsis*, for his species, but Fischer (1887, p. 412) used this name for *Phellia nummus* Andres. However, the latter is not a *Telmatactis*. According to Verrill (1899c) the acontia are absent in *panamensis*, but I think he overlooked them.

Family HORMATHIIDAE

CALLIACTIS VARIEGATA Verrill

FIGURE 80, *d*

Calliactis variegata VERRILL, 1869, p. 481.

The exterior of the species is well described by Verrill. The larger specimen is very flattened, almost cakelike. The sphincter is strong and distinctly transversely stratified. In its upper part it recalls rather strongly that of *Cricophorus nutrix* (Stuckey) inasmuch as the very elongate muscle meshes are separated from each other by mesogloea balks running parallel with each other. The lower part of the sphincter is illustrated in figure 80, *d*. The nematocysts of the tentacles are about 20.5 by 2–2.5 μ (basitrichs, very numerous); those of the actinopharynx 19.7–24 by 2.5–2.8 μ; those of the filaments partly 10.6–12 by 1.5–2 μ (basitrichs), partly 19.5–23.3 by 4.2–5 μ (microbasic *p*-mastigophors); those of the acontia 19.7–24 by about 2.8 μ (basitrichs).

Measurements.—The larger specimen, breadth of pedal disc 3 by 3.5 cm.

Collecting record.—Concepción Bay, March 27, 1940, two specimens from a large conch housing a hermit crab.

Additional distribution record.—Panama.

Remarks.—Whether this species is identical with *C. decorata* (Drayton) from Honden Island is uncertain. According to Verrill, both species agree in color.

Family METRIDIIDAE ?

ISOMETRIDIUM, new genus

Metridiidae ? with broad base. Column divisible into a smooth, very thick scapus, wrinkled in contraction, and a thinner capitulum. No cinclides. Sphincter mesogloeal, situated in the uppermost part of the scapus and in the capitulum. Uppermost part of the capitulum and outer part of the oral disc drawn out to form very numerous, permanent lobes. At the apex of these lobes are extraordinarily numerous, short, filiform tentacles, all of about the same length, their longitudinal muscles ectodermal. Oral disc forming a wall inside the tentacles. Radial muscles well developed, ectodermal, present only on the inside of the lobes and on the outside of the wall; inner part of oral disc, however, without radial muscles. Two very broad siphonoglyphs. Mesenteries very numerous, several pairs perfect, two pairs of directives; the 12 first pairs sterile. Retractors of the mesenteries diffuse, not strong. Acontia numerous. Cnidom: spirocysts, basitrichs, microbasic *p*-mastigophors, microbasic amastigophors (and possibly microbasic *b*-mastigophors).

The position of this genus is doubtful because I cannot decide the type of the nematocysts of the acontia, especially whether there are basitrichs or *b*-mastigophors present. If the acontia have basitrichs, the genus may be referred to the family Sagartiidae, but in such a case *Isometridium* would be a very aberrant genus in that family. The thick column recalls that of many genera of the family Actinostolidae.

ISOMETRIDIUM RICKETTSI, new species

FIGURE 81, *a*, *b*; PLATE 14, FIGURES 3, 4

Scapus up to almost 1 cm. thick in preserved state. Sphincter of the scapus transversely stratified, that of the capitulum forming a single row of muscle meshes. Tentacles very delicate, not arranged in distinct cycles. Oral disc inside the wall without radial muscles. The very broad siphonoglyphs provided with very large gonidial tubercles. Mesenteries very numerous; at least the stronger hexamerously arranged. Probably considerably more mesenteries distally than proximally. About 48 pairs of mesenteries perfect, the 12 oldest pairs sterile, the others perfect and the stronger imperfect fertile. Nematocysts of the capitulum partly 26.8–35.2 by 5–6.6 μ (basitrichs), partly 19.7–24 by 3.5–4.2 μ (microbasic

p-mastigophors or amastigophors) ; those of the tentacles partly 14.8–19 by 3–3.5 μ, partly 24.7–31 by 3.5–4.2 μ (often somewhat curved, microbasic *p*-mastigophors ?) those of the actinopharynx 23.3–31 by 2.8–4 μ (basitrichs) ; those of the filaments 11.3–18.3 by 4.2–6.3 μ (piriform, microbasic *p*-mastigophors) ; those of the acontia partly 46.5–55 by 5.6–6.3 μ (probably microbasic amastigophors), partly 26.8–32 by 2.8 μ (basitrichs or microbasic *b*-mastigophors). All nematocysts are unexploded and therefore the type of nematocyst is usually difficult to decide.

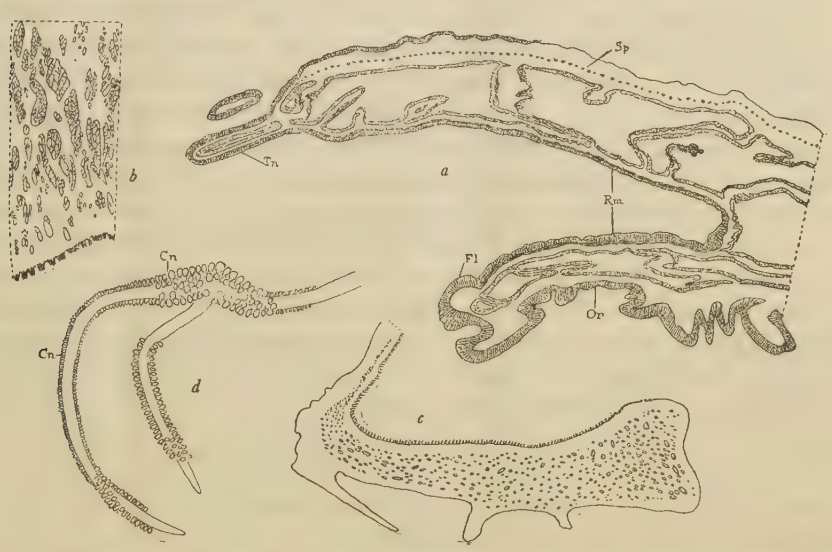

FIGURE 81.—*a, Isometridium rickettsi,* new species, longitudinal section of capitulum and fold (*Sp,* sphincter; *Tn, te*nacle; *Rm,* radial muscles;; *Fl,* fold; *Or,* inner part of oral disc); *b, I. rickettsi,* part of sphincter in the scapus. *c, Anthothoë panamensis* (Verrill) ? sphincter. *d, Botruanthus benedeni* (Torrey and Kleeberger), cnidorages (*Cn*) on a branched craspedoneme.

Measurements.—Diameter of pedal disc and height of the column 11 cm., corona up to 12 cm., length of tentacle 0.5–0.6 cm.

Holotype.—U.S.N.M. No. 49458, Guaymas, Mexico, April 9, 1940.

Remarks.—The appearance of this very interesting type (pl. 14, fig. 3) resembles that of *Metridium,* but its organization is quite different from that of this genus. The scapus is smooth but very wrinkled, probably owing to strong contraction. The part of the sphincter situated in the scapus is rather short, occupies at most about two-thirds of the thickness of the mesogloea, and is wholly separated from the endodermal muscles of the column. It is distinctly transversely stratified and the larger muscle meshes are divided into numerous smaller ones (fig. 81, *b*). It diminishes

quickly aborally; distally it runs over gradually into the muscle meshes of the capitulum, which are arranged in a single row (fig. 81, *a*). The lobes of the capitulum are very numerous, the tentacles thin and delicate and extraordinarily numerous, certainly more numerous than those of *Metridium*. They appear as a rim on the end of the lobes and their arrangement is impossible to determine, and it is even difficult to distinguish the directive tentacles from the others. The inside of the lobes and the outside of the fold are provided with well-developed ectodermal radial muscles (fig. 81, *a*). The inner part of the oral disc, which is devoid of radial muscles, is very wrinkled and broad, but narrow at the directives owing to the occurrence of very large gonidial tubercles. The very broad siphonoglyphs, symmetrically set, are prolonged almost to the base of the body. The retractors are diffuse, strongest in the innermost parts of the mesenteries and there forming palisadelike folds. The mesogloea of the filaments, especially that of the middle tract, is very thick in the region of the ciliated tract of the perfect mesenteries. The ova are small, the acontia thin but numerous. Plate 14, figure 4, shows a part of the oral disc with the tentacles and the fold, which is radially furrowed (at *x*) on its inside; figure 81, *a*, a longitudinal section of the capitulum and the fold; figure 81, *b*, part of sphincter in the scapus.

Family SAGARTIIDAE

ANTHOTHOËE PANAMENSIS (Verrill) ?

FIGURE 81, *c*

Sagartia panamensis VERRILL, 1869, p. 484.

Pedal disc wide, attached to *Turritella*-like snails. Column translucent showing the insertions of the mesenteries. The body forms a cone in contraction. Sphincter (fig. 81, *c*) alveolar, strong. Tentacles delicate, of moderate length, fewer than the mesenteries at the base. Two siphonoglyphs and two pairs of directives. Mesenteries of the first and second cycles perfect. Retractors diffuse, rather strong with high folds; the parietobasilar muscles well developed, forming a shelf on the weaker mesenteries. The weaker mesenteries of a sectioned individual are provided with ovaria, but the stronger are seemingly sterile and therefore the species may be an *Anthothoë*. The nematocysts of the column are partly 17–19.7 by 2.8–3.5 μ (basitrichs), partly 12.7–16.2 by 2.8–3.5 μ (probably microbasic *p*-mastigophors), both often somewhat curved; those of the tentacles partly 15.1–21.1 by 2.5–2.8 μ (basitrichs), partly 18.3–21.8 by 4.2 μ (often curved, microbasic *p*-mastigophors or amastigophors); those of the actinopharynx partly 19–25.4 by

2.8 μ (basitrichs), partly 19.7–25.4 by 4.2–5.5 μ, partly 10–19 by 4.2–6.3 μ (both microbasic *p*-mastigophors); those of the acontia partly 24–29.6 by 2.8 μ (basitrichs), partly 35.2–42.3 by 6–7 μ (microbasic amastigophors).

Color in alcohol.—Pale flesh-colored.

Measurements.—In contracted state, pedal disc about 1.7 cm., height of the column about 1.2 cm.

Collecting record.—Angeles Bay, April 1, 1940, two specimens on snails from sand flat.

Additional distribution record.—Panama.

Remarks.—I have doubtfully identified the specimens as *Anthothoë panamensis* because of the translucent column and the color.

Order CERIANTHARIA

Family BOTRUCNIDIFERIDAE

BOTRUANTHUS BENEDENI (Torrey and Kleeberger)

FIGURE 81, *d*

Cerianthus benedeni TORREY and KLEEBERGER, 1909, p. 121, figs. 2, 3.
Botryanthus benedeni MCMURRICH, 1910, p. 11.
Botruanthus benedeni CARLGREN, 1912, pp. 42, 44–46.

Marginal tentacles up to about 100. Labial directive tentacle (*d*) present. Arrangement of the labial tentacles: 2(d)413.4312. 4312 —. Up to about eight mesenteries attached to the siphonoglyph. Hyposulcus and hemisulci rather well developed. Free parts of the directives not so long as the actinopharynx. Second protomesenteries long but not so long as the first metamesentery. Free part of the third protomesenteries about the same length as the actinopharynx. Most of the mesenteries *M* and *m* reach down almost to the aboral end of the body, metamesenteries *B* and *b* short. Ciliated tracts a little below the actinopharynx structured as the type 2. The ciliated tracts form a bunch of craspedonemes above the cnidoglandular tract of the third protomesenteries and the *b* and *B* mesenteries. The second protomesenteries and the *M* and *m* metamesenteries are provided with ciliated tracts almost their entire length. In the upper part of these mesenteries the ciliated tracts form bunches of craspedonemes; in the center the craspedonemes are scattered; and in the lowest parts more concentrated. Cnidorages of different size are collected in botrucnide-like bunches or as a pearl necklace on the craspedonemes of the ciliated tracts, either close to the apex of the craspedonemes or more inside. They are more numerous on the branched filaments than on the scattered ones. The second protomesenteries and the *M* and *m* metamesenteries are fertile, the other mesenteries sterile.

The nematocysts of the column are partly 43.7–63.4 by (9) 13–17 μ, partly 68.5–74.7 by 22.5–25.5 μ (both atrichs), partly 33.8–41 by 7–8.5 μ (type a, with a thick long shaft), partly 19.7–22.6 by 2.8–3 μ (type c, with very short shaft), partly 21–22.6 by 2.2–2.8 μ (with thin, long shaft; all three microbasic *b*-mastigophors); those of the marginal tentacles 25.4–28.2 by 4.2–5 μ (type b, shaft about half as long as the capsule; microbasic *b*-mastigophors); those of the labial tentacles partly 31 by 5.6–6.3 μ (atrichs, very rare), partly 31–39.5 by 7–8.5 μ (type a), partly 24–28.2 by 4.2–5 μ (type b), partly 16.2–21 by 2.8–3.5 (type c; all three microbasic *b*-mastigophors); those of the actinopharynx partly 28.2–36.7 by 5.6–7 μ (atrichs, few), partly (31) 35.2–42.3 by 6.3–8.5 μ (type a); partly 26.8–35.2 by 4.2–5.6 μ (type b), partly 18.3–24 by 4.5 μ (type c, all three microbasic *b*-mastigophors); those of the cnidoglandular tract partly 26–27 by 5–6.3 μ (type a), partly 14–19.7 by 2.8–2.5 (type c; both microbasic *b*-mastigophors); those of the craspedonomes of the ciliated tract 19.7–22.6 by 3.5–4.2 μ (type b, microbasic *b*-mastigophors); those of the larger cnidorages 66.3–73 by 14–18.3 μ, those of the smaller 53.6–60 by 12.7–15.5 (both microbasic *b*-mastigophors), moreover, a few *b*-mastigophors with thin long shaft about 22.6 by 4.2–5.6 μ. The column, marginal and labial tentacles, and the craspedonemes are provided with spirocysts.

Color in alcohol.—Column grayish brown, oral disc and labial tentacles red-brown, marginal tentacles almost uncolored, probably not banded.

Measurements.—The largest specimen in contracted state about 12 cm. in length, 2 cm. in greatest breadth.

Collecting records.—San Lucas Cove, south of Santa Rosalia, March 29, 1940, two specimens; Angeles Bay, April 1, 1940, one specimen; Estero de la Luna, Sonora, Mexico, April 10, 1940, one specimen.

Additional distribution record.—San Diego Bay, southern California.

Remarks.—The name *Botryanthus* proposed by McMurrich (1910) for the genus is probably a typographical error. In 1912 (pp. 44–46) I made a summary of the organization based on Torrey and Kleeberger's description of the species. In the present paper this description is completed. Figure 81, *d*, shows cnidorages (Cn) on a branched craspedoneme. The apex and the base of the branches are devoid of cnidorages, which are of very different size. Torrey and Kleeberger (1909) deny the supposition of von Beneden that the cnidorages are homologous with the acontia.

As to the position of the cnidorages and acontia, there are no distinct differences because the acontia sometimes occur in other places than at the end of the mesenteries.

Family CERIANTHIDAE

PACHYCERIANTHUS INSIGNIS, new species

Marginal tentacles about 100. Directive labial tentacle (d) present. Arrangement of labial tentacles 2(d)413.4343. . . . About 8 mesenteries attached to the siphonoglyphs. Hyposulcus rather well developed. Free part of the directives somewhat shorter than the actinopharynx. Free part of the second protomesenteries (*p*2) somewhat more than double as long as the free part of the directives. Third protomesenteries (*p*3) somewhat shorter than *p*2. Several *M* and *m* metamesenteries reach down almost to the proximal end of the body but diminish, as usual, in length toward the multiplication chamber. *B* and *b*-metamesenteries rather short. Ciliated tract of the *M* and *m*-mesenteries distributed over almost their whole length with craspedonemes, which in the upper and lowest parts are more numerous than in the middle of the mesenteries. Craspedonemes of the ciliated tract on the *B* and *b*-metamesenteries absent?; *M* and *m*-mesenteries fertile; the other mesenteries sterile. Nematocysts of the column partly 43.9–64.9 by 12.7–20.4 (22.6) μ, partly 42.3–49 by 7–10 μ (both atrichs), partly 48–56.4 by 11.3–14 μ (holotrichs, rare), partly (26.8) 31–43.7 by 5.6–7 μ (type a microbasic *b*-mastigophors with a long thick shaft), partly 25.4–29.6 by 3.5–4.5 μ (type c microbasic *b*-mastigophors with a short shaft); those of the marginal tentacles partly 24–35.2 by 5–5.6 μ (type a, very common), partly 19.7–24 by 3.5–4.2 μ (both microbasic *b*-mastigophors); those of the labial tentacles partly 31–43.7 by 5–8.5 μ, partly 22.6–28.2 by 3.4–4.2 μ (both microbasic *b*-mastigophors), partly 29.6–35.2 by 5.6–7 μ (atrichs, rather common); those of the actinopharynx partly 29.6–41 by 5–7 μ (atrichs), partly 22.8–42.3 by 5.6–8.5 μ (type a, rather common), partly 26.8–36.7 by 3.5–4.2 μ (scarce), partly 15.5–19.7 by 3.5–4.2 μ (type c; all three microbasic *b*-mastigophors); those of the cnidoglandular tract of the filaments partly 26.8–35.2 by 5.5–7 μ (atrichs, rather common), partly 22.6–32.4 by 6.3–8.5 μ (type a, very common), partly 13.4–19.7 by 6.3–8.5 μ (scarce, both microbasic *b*-mastigophors); those of the craspedonemes of the ciliated tract 28.2–42.3 by 5–5.6 μ (microbasic *b*-mastigophors, very numerous).

Color in alcohol.—Column grayish red-brown, marginal tentacles banded with stripes of red-brown, labial tentacles yellowish brown, actinopharynx yellowish.

Measurements.—In contracted state, length 12.5 cm., greatest breadth 1.5 cm.

Holotype.—U.S.N.M. No. 49454, El Mogote, sand flats, March 22, 1940.

Remarks.—Unfortunately my description of the species is incomplete, owing to the bad preservation of the upper part of the mesenteries. As far as I can see, the species is identical neither with *P. aestuarii* nor with *P. johnsoni,* both described by Torrey and Kleeberger (1909) from southern California.

Order ZOANTHARIA

Family EPIZOANTHIDAE

EPIZOANTHUS CALIFORNICUS, new species

FIGURE 82, *a-d;* PLATE 14, FIGURE 7

? *Epizoanthus elongatus* VERRILL, 1869, pp. 497, 565.

Coenenchyme thin and expanded. Polyps very unequal in size, usually cylindrical, closely set (pl. 14, fig. 7). Coenenchyme and scapus incrusted principally with sand to, at most, half their thickness, incrustations of the scapulus weaker. Ridges of the scapulus rather weak. Owing to the comparatively slight incrustation, the body wall feels rather weak. Sphincter strong with large meshes drawn out transversely. Siphonoglyph well developed, hyposulcus short. Mesenteries 34–38 in number. Numerous pigmented cells in the ectoderm of the column and in the endoderm of the mesenteries. Mesogloea of the column with numerous rounded cells; also pigmented cells here and there. Nematocysts of tentacles partly 12–16.9 by 2.8(3) μ (microbasic *b*-mastigophors), partly 36.7–39.3 by 15.5–17 μ (holotrichs, probably belonging to the endoderm); those of the actinopharynx 15.5–19 by 3 μ (microbasic *b*-mastigophors); those of the filaments 14–17 by 4.2–5.5 μ (microbasic *p*-mastigophors); those of the endoderm of the mesenteries 38–42.3 by 14–17 μ (holotrichs).

Color in alcohol.—Brown.

Measurements.—Length of the polyps up to 0.9 cm., breadth 0.3–0.4 cm.

Cotypes.—A few colonies, U.S.N.M. No. 49456, La Paz, March 21–22, 1940.

Additional distribution record.—Near La Paz (Verrill, 1869, p. 565) ?.

Remarks.—The yellowish-brown pigmented cells are so numerous that they seem completely to fill the ectoderm. Figure 82, *c,* shows a section of the column; figure 82, *b,* a section of the inner part of the mesogloea of the column with large pigmented cells;

figure 82, *a*, a section of the sphincter. The mesogloea of the mesenteries contains very numerous cells, also cell-islets. The latter are sometimes prolonged and take the form of short canals, which, however, do not communicate with one another. In figure 82, *d*, I have drawn the lower part of a macromesentery showing cells and cell-islets. The number of mesenteries in five examined polyps (some of the largest) is 34 (18 + 16), 36 (18 + 18), 37 (18 + 19), 38 (20 + 18), 38 (20 + 18). The tentacles of a sixth polyp is 36. The muscles of the mesenteries are weak.

FIGURE 82.—*a-d, Epizoanthus californicus*, new species: *a*, Sphincter; *b*, section of inner part of mesogloea of column with large pigmented cells; *c*, section of column; *d*, lower part of macromesentery with cells and cell islets. *e, f, Palythoa complanata*, new species: Basal part of two macromesenteries with canal system and holotrichs (*Fil*, filament). *g, h, Palythoa praelonga*, new species: *g*, Sphincter; *h*, sectional column wall.

The species may be related to *Epizoanthus elongatus* Verrill from Peru and Pearl Islands. In fact, the short description of the exterior of Verrill's species agrees well with that given here of *E. californicus*, but, as Verrill notes that the mesenteries of a specimen were 42 and the tentacles 46 in another (therefore 46 mesenteries), it is rather difficult to identify his species with *californicus*, especially since Verrill says that each tentacle has a small tubercle outside of its base. Evidently only the uppermost part of the scapular ridges are sometimes tuberculated in *Epizoanthus*. In our species, the weak ridges do not show any pro-

jections. On the other hand, the specimen which Verrill with some doubt identified with *elongatus,* and which was collected near La Paz, is probably *californicus*. Besides, it is not certain that *elongatus* and the two other species of *Epizoanthus* described by Verrill (1869) belong to this genus, as Verrill synonymized *Gemmaria* (= *Palythoa*) with *Epizoanthus*.

EPIZOANTHUS GABRIELI, new species

PLATE 14, FIGURE 6

A small colony of five polyps (pl. 14, fig. 6) incrusted with grains of sand occupying the main part of the mesogloea, very closely set. Close to the endoderm there are very numerous cells in the mesogloea, which occur frequently in the mesogloea of the actinopharynx and in the outer part of the mesenteries as well. Coenenchyme flat, thin. Polyps elongate. Ridges of the scapulus distinct, heavily incrusted but hardly visible in contracted polyps. Sphincter mesogloeal, strong, broad, transversely stratified. Siphonoglyphs well developed. Mesenteries in a larger specimen examined 30, of which 16 (8 + 8) are macrocnemes. Nematocysts of the tentacles 14–19 by about 2.8 μ (microbasic *b*-mastigophors); those of the actinopharynx 15.5–19.7 by 2.8–3 μ (microbasic *b*-mastigophors, common); those of the filaments 11.3–16.2 by 2.8–4.2 μ (microbasic *p*-mastigophors), moreover a few 10–11 by 3–3.5 μ (probably holotrichs, possibly belonging to the endoderm); those of the endoderm 38–43.7 by 14–15 (18.3) μ.

Color in alcohol.—Dark grayish.

Measurements.—Largest polyp, length 0.8 cm., breadth about 0.35 cm.

Holotype.—One colony, U.S.N.M. No. 49463, Gabriel Bay, Espíritu Santo Island, April 2, 1940.

Family ZOANTHIDAE

PALYTHOA COMPLANATA, new species

FIGURE 82, *e, f;* PLATE 14, FIGURE 9

Polyps scarcely projecting above the surface of the very thick coenenchyme, very closely set and of very different size, the smallest polyps occurring in the outermost part of the colony (pl. 14, fig. 9). Coenenchyme heavily incrusted with grains of sand. Ectoderm of the scapulus rather thin, without a cuticle. Ridges of the scapulus 18–21 (11 specimens examined). Mesogloea of the coenenchyme and column with cells and cell-islets. Sphincter forming a row of meshes. Tentacles small, with spirocysts. Siphonoglyph strong, hyposulcus long. Mesenteries up to more than 40. Branched pigmented cells and holotrichs in the

mesenterial canals. Figure 82, *e* and *f*, shows the basal parts of two macromesenteries with their canal system and holotrichs (the pigmented cells not figured, *f*-filament). Nematocysts of the tentacles 45–57.8 by 22.6–28.2 μ (holotrichs); those of the actinopharynx 24–29.6 by about 4.2 μ (microbasic *b*-mastigophors); those of the filaments partly 56–65 by 19.7–22.6 μ (holotrichs), partly (18.3) 21.1–24 by 4.2–5.6 μ (microbasic *p*-mastigophors), partly 37.4–47.9 by 5.6–6 μ (microbasic *b*-mastigophors); those of the mesenterial canals 52.2–63.5 by 22.6–25.4 μ (holotrichs).

Color in alcohol.—Brownish gray.

Measurements.—Larger polyps, breadth 0.9 cm., breadth of colony 5 by 6 cm.

Holotype.—One colony, U.S.N.M. No. 49455, Puerto Escondido, March 26, 1940.

Remarks.—A great area of rock and sponge was covered with these colonies.

PALYTHOA PRAELONGA, new species

FIGURE 82, *g*, *h*; PLATE 14, FIGURE 10

Solitary, extraordinarily elongate polyps, narrow in their lower part increasing in breadth toward the scapulus (pl. 14, fig. 10). About half to two-thirds of the mesogloea of the column incrusted with grains of lime. Mesogloea of the column with cells and cell-islets showing tendency to a ringlike arrangement toward the endoderm. Ridges of the scapulus about 32 or more, incrusted. Sphincter forming a row of very large, broad muscle meshes drawn out transversely (fig. 82, *g*, part of the sphincter). Tentacles with spirocysts. Siphonoglyph well developed, hyposulcus short. Mesenteries of the largest specimen about 72; without pigmented cells in their canal system, which probably does not contain any holotrichs in its lower part but has some in its upper (see fig. 82, *h*, which shows a section of the column in its upper part). Owing to the smallness of the mesenteries at the base, it is very difficult to determine if holotrichs are present; if so they may be very rare. Nematocysts of the column partly 19.7–33.8 by 5–5.6 μ (microbasic *p*-mastigophors, very rare), partly 18.3–21 by 3–3.5 μ (microbasic *b*-mastigophors); those of the tentacles partly 22.6–32.4 by 4.5–5 μ (few, microbasic *p*-mastigophors), partly 21.1–25.4 by about 3 μ (microbasic *b*-mastigophors), partly 48–49.3 by 21 μ (holotrichs—probably in endoderm); those of the actinopharynx 32.4–39.5 by 4.2–5 μ (microbasic *b*-mastigophors); those of the filaments partly 25.4–38 by 4.2–7 μ (microbasic *p*-mastigophors), partly 38.8–53.6 by 4.2–5.6 μ (microbasic *b*-mastigophors), partly 48–56.4 by 23.3–24 μ (holotrichs, rather scarce).

Color.—Yellowish gray.

Measurements.—Length 12.5 and 10 cm., respectively; breadth in their uppermost part 1.2 and 0.8 cm., respectively.

Cotypes.—Two specimens, U.S.N.M. No. 49445, Gabriel Bay, Espíritu Santo Island, April 12, 1940.

PALYTHOA RICKETTSI, new species

FIGURE 83, *a, b;* PLATE 14, FIGURE 11

Coenenchyme thin. Polyps robust, elongate, closely set (pl. 14, fig. 11) incrusted with grains of sand occupying the continuous ectoderm and the outermost part of the mesogloea only. Mesogloea of the column with cells and very numerous cell-islets often showing tendency to be arranged in an annulus toward the endoderm. (Figure 83, *a,* shows a transverse section of a part of the column). Ridges of the scapulus about 30–32 in larger specimens. Sphincter forming a row of rather broad meshes transversely set. Ectoderm of the column, tentacles, oral disc, and cell-islets provided with zooxanthellae. Tentacles seemingly without spirocysts. Siphonoglyph strong. Mesenteries in large specimens about 66. No holotrichs and no pigmented cells in the lower part of the mesenterial canals, but holotrichs are present although very rare in the upper part. Nematocysts of the tentacles partly 41–48 by 19.5–21 (24) μ (holotrichs, few), partly about 28 by 2.8 μ (microbasic *b*-mastigophors, very rare); those of the actinopharynx 30–39.5 by 4.2–5 μ (microbasic *b*-mastigophors); those of the filaments partly 49.3–56 by 22–25.4 μ (holotrichs, few), partly 29.6–40 by 4.2–7 μ (microbasic *p*-mastigophors), partly 42.3–56.4 (60.5) and 3–3.5 μ (microbasic *b*-mastigophors).

Color in alcohol.—Gray with scattered black and yellowish grains of sand.

Measurements.—The largest polyp, contracted, is 2 cm. in length, 0.9 cm. in breadth at uppermost part.

Types.—Holotype, a small colony, U.S.N.M. No. 49440, south of Tiburón Island, April 3, 1940. Paratype, a small colony, U.S.N.M. No. 49441, same data.

PALYTHOA IGNOTA, new species

FIGURE 83, *c, d;* PLATE 14, FIGURE 12

Coenenchyme rather thin. Polyps more or less closely set (pl. 14, fig. 12) in contraction, somewhat longer than broad, robust, strongly incrusted with grains of sand penetrating almost the whole mesogloea of the column (fig. 83, *c*). Ectoderm of the column rather thin, mesogloea with cells but with few cell-islets. Ridges of the scapulus incrusted. Sphincter very elongate, of about same appearance as that of *P. ignota.* Cell-islets, ectoderm and

endoderm of the column, ectoderm of the tentacles with that of the actinopharynx without zooxanthellae. Tentacles with spirocysts. Siphonoglyph and hyposulcus strong. Mesenteries in large specimens about 50–58 (51 in a sectioned specimen; in the largest specimen there are 58 tentacles and therefore the same number of mesenteries). Micromesenteries well developed. No pigmented cells but numerous holotrichs in the mesenterial canals. Figure 83, *d*, shows a macromesentery seen from the side (inner side on the left). Nematocysts of the tentacles 21–31 by 3.5–4 μ (microbasic *b*-mastigophors); those of the filaments partly 51–62 by 19.7–21 μ, partly 15.5–17.6 by 3.5–4 μ (both holotrichs), partly 18.3–21.8 by 4.2–5.6 μ (microbasic *p*-mastigophors), partly 49.3–65 by about 4 μ (microbasic *b*-mastigophors).

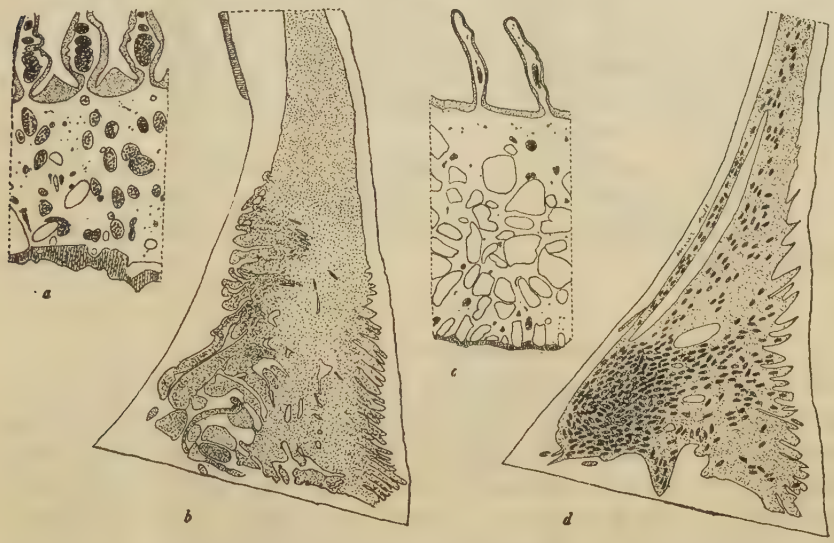

FIGURE 83.—*a, b, Palythoa rickettsi,* new species: *a,* Transverse section of column; *b,* macromesentery seen from the side. *c, d, Palythoa ignota,* new species: *c,* Section of column; *d,* macromesentery seen from the side (inner side to left).

Color in alcohol.—Grayish.

Measurements.—Larger polyps, contracted, 1.2 cm. in length, 0.7–0.9 cm. in breadth.

Holotype.—One colony, U.S.N.M. No. 49541, Angeles Bay, April 1, 1940, on rocks.

PALYTHOA INSIGNIS, new species

FIGURE 84, *a-c;* PLATE 14, FIGURE 13

Polyps somewhat elongate, of different size, connected with a rather thin coenenchyme (pl. 14, fig. 13). Ridges of the scapulus 24–32, incrusted. The ectoderm and the outer part of the mesogloea of the column incrusted with grains of sand. Mesogloea of

the column with cells and extraordinarily numerous cell islets (fig. 84, *a*). Sphincter strong, forming a single row of meshes (fig. 84, *b*). Tentacles with numerous spirocysts. Siphonoglyph well developed, hyposulcus strong. Mesenteries some up to more than 60. A sectioned specimen has 62 (32 + 30) mesenteries, another about 60. Numerous pigmented cells and holotrichs in the mesenterial canals. Figure 84, *c*, shows a macromesentery in its lower part (inner side to the right, the pigmented cells are not figured). Ectoderm of the column, tentacles, and oral disc with zooxanthellae. Nematocysts of the column 45–57.8 by 22.6–28.2 μ (holotrichs); those of the tentacles partly 18.3–24 by 3–4.2 μ (microbasic *b*-mastigophors), partly 46.5 by 21 μ (holotrichs, very rare); those of the actinopharynx 25.4–39.5 by 3.5–4.2 μ (microbasic *b*-mastigophors); those of the filaments partly 24–29.6 by 4.2–5.6 (microbasic *p*-mastigophors, common), partly 39.5–52.2 by about 4.2 μ (microbasic *b*-mastigophors), partly 48–53.6 by 19.7–21 μ (holotrichs, very rare); those of the mesenterial canals 50–52.2 by 19.7–22.6 μ (holotrichs, numerous).

Measurements.—The larger polyps are 1.5 and 1.3 cm., respectively, in length, and 0.7 and 0.8 cm., respectively in breadth.

Cotypes.—Two colonies, U.S.N.M. No. 49540, Coronado Island, March 27, 1940.

PALYTHOA PAZI, new species

FIGURE 84, *d*; PLATE 14, FIGURE 14

Polyps connected with a rather thin coenenchyme (fig. 84, *d*), incrusted with grains of sand occupying almost the whole mesogloea of the column. Mesogloea with rather numerous cells and cell-islets. Ridges of the scapulus distinct in the larger polyps and about 27–30 in number. Ectoderm of the column, tentacles, and oral disc with zooxanthellae. Tentacles with numerous spirocysts. Siphonoglyph strong. Mesenteries in large specimens up to about 60. Mesenterial canals with holotrichs and pigmented cells. In figure 84, *d*, the lower part of a macromesentery is reproduced, the pigmented cells are not figured (inner side on the left). Nematocysts of the actinopharynx 24–33.8 μ (microbasic *b*-mastigophors); those of the filaments partly 28.3–31 by 4.5–6.3 μ (microbasic *p*-mastigophors), partly 35.2–50.8 by 4.5–5 μ (microbasic *b*-mastigophors), partly 45–50.8 by 21–24 μ (holotrichs, very rare); those of the mesenterial canals 49.3–55 by 19.7–22.5 μ (holotrichs).

Measurements.—Largest polyp, 1 cm. in length, 0.7 cm. in breadth; another polyp is 1.1 cm. in length, 0.6 cm. in breadth.

Holotype.—One colony, U.S.N.M. No. 49444, La Paz, on calcareous rocks, March 14, 1940.

ZOANTHUS DANAE (LeConte) ?

FIGURE 84, *e–h*

Zoantha danae LeConte, 1851, p. 320.
Zoanthus danae Verrill, 1866, p. 329.—Andres, 1883, p. 539.
Mamillifera danae Verrill, 1869, p. 496.

The polyps are rather thinly set and connected with a rather thin coenenchyme. The ectoderm of the scapulus is discontinuous but the mesogloea balks are very narrow. In the ectoderm of the column, numerous pigmented cells of varying appearance are collected. These are also present in the ectoderm of the tentacles and actinopharynx, in the mesogloea of the column, and in the endoderm. In figure 84, *e*, I have drawn some cells of the scapus. The canal system of the scapus at the level of the actinopharynx or just below it shows a rather closely set network, which in an individual from Puerto Escondido is somewhat thinner (fig. 84, *f*) than that of a specimen from Concepción Bay (fig. 84, *g*). The sphincters are strong, especially the lower sphincter, which is broad in its upper part but diminishes rather quickly downward. The muscle meshes

FIGURE 84.—*a-c, Palythoa insignis,* new species: *a,* Section of column; *b,* sphincter; *c,* lower part of macromesentery, inner side to right. *d, Palythoa pazi,* new species, lower part of macromesentery, inner side to left. *e-h, Zoanthus danae* (LeConte) ?: *e,* Cells of scapus; *f,* canal system of scapus of specimen from Puerto Escondido; *g,* canal system of scapus of specimen from Concepción Bay; *h,* sphincter. *i, Zoanthus depressus,* new species, sphincter.

show a tendency to transverse stratification. I have sectioned sphincters of individuals from all localities; they agree rather well. In figure 84, *h*, I have drawn the sphincter of a specimen from Puerto Escondido; the muscle meshes are usually a little larger in other specimens. The tentacles are small, their spirocysts are few or almost absent. The siphonoglyph is indistinct. The mesenteries vary from 48 to 57 (26 + 32; 28 + 24; 28 + 26; 31 + 26). They are thin, provided with a wide canal in the outer, swollen part; in their inner parts there are no canals or very few. Their muscles are distinct but form no pennons. The nematocysts of the scapus are 15–18.3 by 5.6–7 μ (holotrichs); those of the tentacles 13.4–18.3 by 5.6–7 μ (holotrichs); those of the actinopharynx partly 14–18 by 3.5–7 μ (holotrichs), partly 15–18.3 by 3–4 μ (microbasic *b*-mastigophors); those of the filaments partly 14–19.7 by 5.6–8.5 μ (holotrichs), partly 17–24 by 4.2–5.6–8.5 μ (holotrichs), partly 17–24 by 4.2–5.6 μ—in the specimens from Concepción Bay, narrower, 2.5–3.5 μ (microbasic *p*-mastigophors). Specimens from all localities were examined.

Color.—The living colony from Concepción Bay was blue-green.

Measurements.—Polyps in contracted state, length up to about 0.9 cm., breadth up to 0.4 cm.

Collecting records.—Puerto Escondido, on rocks, March 26, 1940, two colonies; Coronado Island, March 27, 1940, four colonies on fragments of lime; Concepción Bay, March 27, 1940, two colonies.

Additional distribution records.—Pearl Islands, Panama.

Remarks.—I have with some doubt identified the specimens with *Z. danae*, though the color of the specimens from Concepción Bay indicates that they may be referred at some time in the future to *Mamillifera* (= *Zoanthus*) *nitida*, described by Verrill (1869, p. 497).

I cannot understand Verrill's statement that there are 27 small tubercles inside the bases of the inner tentacles and opposite the outer tentacles. The species may be a *Zoanthus* as "the basal membrane and surface of the polyps are smooth and soft, without any adhering sand." Andres thinks that the tubercles are "brattee" but these do not occur in *Zoanthus*.

ZOANTHUS DEPRESSUS, new species

FIGURE 84, *i*

Owing to the very scant material available I can give only a very short description of this species, but it is certainly different from *Z. danae*. The small colony consists of a mother polyp and two

small daughter polyps, the one connected with the mother by a very thin coenenchyme, the other running out from the base of the mother. The body of the contracted polyps is very depressed so that they show a cakelike appearance. Both sphincters are well developed with rather coarse muscle meshes. Figure 84, *i*, shows the sphincters of one of the daughter polyps. The ectoderm of the tentacles is provided with very numerous spirocysts in contradistinction to that of the tentacles in *Z. danae*. The mesenteries of the large polyp are apparently about 46 in number.

Measurements.—Largest polyp in contracted state, 0.3 cm. in breadth, 0.1 cm. in height (depressed).

Holotype.—One colony, U.S.N.M. No. 49443, Cape San Lucas, March 18, 1940.

SOME ZOOGEOGRAPHICAL CONCLUSIONS

The upper littoral fauna of the Gulf of California and the waters down to Peru is a warm-water fauna containing, as far as the groups treated here are concerned, such genera as *Zoanthus, Palythoa,* and *Phyllactis*. These regions have several genera in common, but there are differences too. Three genera, *Calamactis, Phialoba,* and *Isometridium,* all new to science, are seemingly endemic in the Gulf of California. To these we may add *Botruanthus,* which, however, occurs in southern California not far from the border to Baja California. Moreover, the genera *Nemanthus, Alicia, Gyrostoma, Andvakia, Epiactis, Aiptasiomorpha,* and *Pachycerianthus* are seemingly absent in the waters between Panama and Peru. On the other hand, *Isarachnanthus, Bartholomea* (*Aiptasia* ?), and the dubious genera *Nemactis* and *Anactis* occur here but not in the Gulf of California. The genera that these waters have in common are *Phymactis, Anthopleura, Bunodosoma, Bunodactis, Phyllactis, Telmatactis, Anthothoë* (Verrill's *Sagartia* species are certainly *Anthothoë* or *Actinothoë* but not *Sagartia*), *Zoanthus, Epizoanthus,* and probably *Palythoa,* though it is difficult to decide if Verrill's *Epizoanthus* always is a homogenous genus.

Some authors have raised the question: Does there exist any relation between the fauna of the west side and that of the east side of Central America? How is this applied to the actinians? Unfortunately, the actinian fauna on the east coast of Mexico is unknown, but we know it on the northern coast of the Gulf of Mexico and, have still better knowledge of it from the West Indies, as this fauna has been studied by many authors. Thus, owing to

our incomplete knowledge of the actinians of the east side of Central America, the comparison given below is, of course, incomplete and defective.

The genera occurring in warm water in western America but not in the Gulf of Mexico or Caribbean Sea are *Calamactis, Phialoba, Isometridium, Nemanthus, Alicia, Epiactis, Phymactis* (provided *Cystiactis koellikeri* described from West Indian waters by Pax in 1910, p. 180, is not a *Phymactis*), *Gyrostoma* (the single small specimen from the West Indies described as a *Gyrostoma* by Pax (1910, p. 176) is very doubtful and probably a very young *Actinia* as Pax first suspected), *Aiptasiomorpha, Botruanthus, Isaracnanthus,* and *Pachycerianthus.*

The genera inhabiting the waters of the Gulf of Mexico and West India but not, so far as we know at present, the districts of Baja California to Peru are: All Corallimorpharia, *Edwardsia, Isoedwardsia, Bunodeopsis, Lebrunia, Actinia, Anemonia, Condylactis, Actinoporus, Stoichactis, Homostichanthus, Phymanthus, Isaurus,* and *Parazoanthus.*

The west and east sides of Central America have the following genera in common: *Anthopleura, Bunodosoma, Bunodactis, Phyllactis, Telmatactis, Anthothoë* (*Actinothoë*), *Zoanthus, Palythoa,* and *Epizoanthus.*

As we can see, there is a great difference between the actinian fauna on the west and east sides of Central America. That the Corallimorpharia, apart from the genus *Corynactis,* and the genera *Lebrunia, Actinoporus, Stoichactis, Homostichanthus, Phymanthus, Bunodeopsis,* and *Isaurus* which, as a rule, are inhabitant on coral reefs, do not occur on the west side is an easily explained fact, because reef-constituent corals, though occurring, do not form actual reefs there. It is curious, however, that there is no account of *Corynactis* on the west side, though species of it live in California and in Chile, but it is possible that the genus exists in the lower littoral zone. Moreover, it is very probable that *Edwardsia* appears on the west side, as the species of this genus are distributed in all oceans. The same probably is also true of *Isoedwardsia.* It is peculiar that *Actinia, Anemonia,* and *Condylactis,* which live in many other localities than on coral reefs, have not been discovered on the west side.

As to the genera that are common between the west and the east sides, *Anthopleura, Bunodactis, Telmatactis, Actinothoë* and *Anthothoë, Zoanthus, Palythoa,* and *Epizoanthus,* they are so widely distributed in warmer waters that we cannot conclude that the actinian fauna of these districts are nearly related to each

other. Only the occurrence of *Bunodosoma* and still more of *Phyllactis* indicates that a communication took place during earlier periods. The fact is that both *Bunodosoma* and *Phyllactis* have their principal distribution in the Atlantic Ocean. Besides, *Bunodosoma* occurs in the southwest part of the Indian Ocean and *Phyllactis* in the Red Sea. Species of the latter genus have been described also from Japan and New Zealand but they may probably be referred to another genus. It is remarkable that the actinian fauna of Baja California contains two genera, *Nemanthus* and *Gyrostoma*, which seem to be exclusively Pacific. *Nemanthus* occurs also off the coasts of Japan and the Bonin Islands. It seems, however, to live usually in the lower littoral zone, but is known from Misaki at a depth of 6 meters. *Gyrostoma* is common in the Indian and Pacific Oceans, but not with certainty reported from the Atlantic. The species taken in the West Indies is probably a young *Actinia* (see above), and the badly preserved specimens of *G. monodi*, from the coast of Cameroon, need a renewed examination.

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ACTINIAN FAUNA FROM THE GULF OF CALIFORNIA

1, *Phyllactis concinnata* (Drayton); 2, *Phyllactis bradleyi* (Verrill); 3, 4, *Isometridium rickettsi,* new species; 5, *Phialoba steinbecki,* new species; 6, *Epizoanthus gabrieli,* new species; 7, *Epizoanthus californicus,* new species; 8, *Aiptasiomorpha elongata,* new species; 9, *Palythoa complanta,* new species; 10, *Palythoa praelonga,* new species; 11, *Palythoa rickettsi,* new species; 12, *Palythoa ignota,* new species; 13, *Palythoa insignis,* new species; 14, *Palythoa pazi,* new species.

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